FTIR STUDIES OF NITROGEN-DOPED CARBON NANOTUBES

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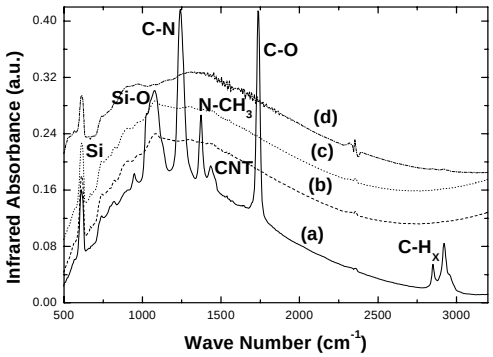
Abstract

Purified and defect free carbon nanotubes have great potential of applications in electronic, polymer composites and biological sciences. The removal of impurities (carbon nanoparticles and amorphous carbon) is an important step before the CNT applications have been realized[1,2]. In this paper we report the results of FTIR and TGA studies of the impurities present in the carbon nanotubes. The multiwalled CNTs were grown using Microwave Plasma Chemical Vapor Deposition (MPCVD) technique. Fourier transform infrared (FTIR) studies were carried out in the range 400-4000 cm^{-1} to study the attachment of the impuriteis on carbon nanotubes. FTIR spectra of as-grown MWCNTs shows dominant peaks at 614, 1026, 1372, 1445, 1736, 2362, 2851, 2925cm^{-1} which are identified as Si-O, Si, C-N, N-CH_3, CNT , C-O, C-H_x respectively. The peaks are sharp and highly intense showing the chemical adsorption nature of the dipole bond. The intensity of the peaks due to N-CH_3, C-N and C-H reduces after annealing. It is interesting to note that these peaks vanish on annealing at high temperature (900^0C). The presence of C-N peak may imply the doping of the CNTs with N in substitution mode, TGA measurements, carried out under argon flow, show that the dominant weight loss of the sample occurs in the temperature range 400-600 ^{o}C corresponding to the removal of the impurities and amorphous carbon.



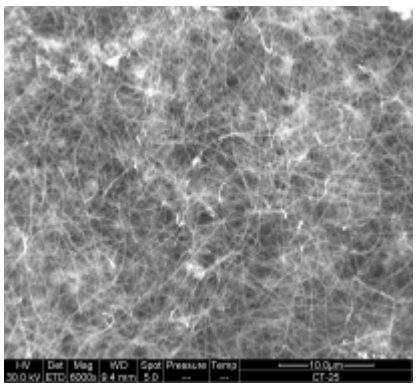


Figure 1(a): FTIR spectra of carbon nanotubes. (b) SEM image of carbon nanotubes grown on Cu foil.

References

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